Amendments to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of Claims:

1. (Currently Amended) A heat transferring device for thermally communicating heat energy being produced by a rolling-element bearing for a rotating shaft of one of an apparatus or system to a heat sink, where the heat energy being generated by the rolling-element bearing is un-useable heat energy with respect to the apparatus or system, said heat transferring device comprising:

a flexible thermally conductive member, a first end of which is thermally coupled to the rolling-element bearing for the rotating shaft, and a second end of which is thermally coupled to the heat sink.

2. (Currently Amended) The heat transferring device of claim 1, wherein the flexible thermally conductive member is configured and arranged so that at least some of the heat energy being generated by the rolling element bearing is communicated to the heat sink.

3. (Currently Amended) The heat transferring device of claim 2 wherein the flexible thermally conductive member is configured and arranged so that a majority of the heat energy being generated by the rolling element bearing for the rotating shaft is communicated to the heat sink via the heat transferring device.

4. (Currently Amended) The heat transferring device of claim 2 wherein the flexible thermally conductive member is configured and arranged so that one of at least 50% or 80% of the heat energy being generated by the rolling-element bearing is communicated to the heat sink via the heat transferring device.

5. (Currently Amended) The heat transferring device of claim 1, wherein the flexible thermally conductive member is configured and arranged so as to allow relative motion between the rolling-element bearing and a portion of the heat sink.

6. (Currently Amended) The heat transferring device of claim 2, wherein the flexible thermally conductive member is configured and arranged so as to allow relative motion between the rolling-element bearing and a portion of the heat sink.

7. (Original) The heat transferring device of either of claims 5 or 6, wherein the relative motion being allowed is in one of in one direction, in two directions or in three directions.

8. (Currently Amended) The heat transferring device of either of claims 5 or 6, wherein the relative motion being allowed between the rolling-element bearing and the heat sink is in at least one of a radial direction, an axial direction, or an angular direction with respect to the rolling element bearing.

9. (Currently Amended) The heat transferring device of any of claims 1, 2, 5 or 6, further comprising a plurality of flexible thermally conductive members, where the first end of each of the plurality of flexible thermally conductive members is thermally coupled to the rolling element bearing and where the second end of each of the plurality of flexible thermally conductive members is thermally coupled to the heat sink.

10. (Original) The heat transferring device of any of claims 1, 2, 5 or 6, wherein the flexible thermally conductive member is comprised of a plurality or more of flexible elements.

11. (Original) The heat transferring device of claim 9, wherein each of the plurality of flexible thermally conductive members is comprised of a plurality or more of flexible elements.

12. (Original) The heat transferring device of any of claims 1, 2, 5 or 6, wherein the flexible thermally conductive member is a flexible multi-strand cable, where one or more strands is made from a thermally conductive material.

13. (Original) The heat transferring device of claim 11, wherein each of the plurality of flexible thermally conductive members is a flexible multi-strand cable, where one or more strands is made from a thermally conductive material.

14. (Currently Amended) The heat transferring device of any of claims 1, 2, 5 or 6, further comprising:

a first thermally conductive member being configured and arranged to thermally couple the first end of the flexible thermally conductive member to the rolling-element bearing for the rotating shaft; and

a second thermally conductive member being configured and arranged to thermally couple the second end of the flexible thermally conductive member to the heat sink.

15. (Currently Amended) The heat transferring device of claim 9, further comprising:

a first thermally conductive member being configured and arranged to thermally couple the first end of each of the plurality of flexible thermally conductive members to the rolling-element bearing for the rotating shaft; and

a second thermally conductive member being configured and arranged to thermally couple the second end of each of the plurality of flexible thermally conductive members to the heat sink.

16. (Currently Amended) The heat transferring device of claim 14, wherein the first thermally conductive member and the second thermally conductive member are arranged such that the flexible thermally conductive member extends therebetween in one of a generally radial direction or a generally axially direction with respect ~~of~~ to the rolling-element bearing for the rotating shaft.

17. (Original) The heat transferring device of claim 16, wherein at least a portion of the flexible thermally conductive member extending therebetween is arcuate.

18. (Currently Amended) The heat transferring device of claim 15, wherein the first thermally conductive member and the second thermally conductive member are arranged such that each of the plurality of flexible thermally conductive members extends there between in on of a generally radial direction or a generally axially direction with respect to the rolling-element bearing for the rotating shaft.

19. (Original) The heat transferring device of claim 18, wherein at least a portion of each of the plurality of flexible thermally conductive members extending there between is arcuate.

20. (Original) The heat transferring device of claim 1, wherein the flexible thermally conductive member is comprised of a thermally material that is at least one of copper, aluminum, silver and carbon.

21. (Original) The heat transferring device of claim 14, wherein each of the first and second thermally conductive members comprises a thermally conductive material that is at least one of copper, aluminum, silver and carbon.

22. (Currently Amended) A heat transferring device for thermally communicating heat energy being produced by a rolling element bearing for a rotating shaft of one of an apparatus or system to a heat sink, where the heat energy being generated by the rolling-element bearing is un-useable heat energy with respect to the apparatus or system, said heat transferring device comprising:

a first thermally conductive member that is thermally coupled to the rolling element bearing for the rotating shaft;

a second thermally conductive member that is thermally coupled to the heat sink;

a third thermally conductive member, a first end of which is thermally coupled to the first thermally conductive member and a second end of which is thermally coupled to the second thermally coupled conductive member;

wherein the third thermally conductive member is configured and arranged so that a majority of the heat energy being generated by the rolling-element bearing for the rotating shaft is communicated to the heat sink via the first, third and second conductive members respectively;

wherein the third thermally conductive member is a flexible member that is configured and arranged so as to allow relative motion between the first and second thermally conductive members.

23. (Currently Amended) The heat transferring device of claim 22 wherein the third thermally conductive member is configured and arranged so that one of at least 50% or 80% of the heat energy being generated by the rolling element bearing for the rotating shaft is communicated to the heat sink via the heat transferring device.

24. (Original) The heat transferring device of claim 22, wherein the relative motion being allowed is in one of in one direction, in two directions or in three directions.

25. (Currently Amended) The heat transferring device of claim 22, wherein the relative motion between the first and second thermally conductive members is in at least one of a radial direction, an axial direction, or an angular direction with respect to the rolling-element bearing for the rotating shaft.

26. (Original) The heat transferring device of claim 22, further comprising a plurality of third thermally conductive members, where the first end of each of the plurality of third thermally conductive members is thermally coupled to the first thermally conductive member and where the second end of each of the plurality of third thermally conductive members is thermally coupled to the second thermally conductive member.

27. (Original) The heat transferring device of claim 22, wherein the first thermally conductive member and the second thermally conductive member are arranged such that the flexible thermally conductive member extends therebetween in one of a generally radial direction or a generally axially direction.

28. (Original) The heat transferring device of claim 26, wherein at least a portion of the flexible thermally conductive member extending therebetween is arcuate.

29. (Original) The heat transferring device of claim 25, wherein the third thermally conductive member is configured and arranged so as to have spring constants in each of the axial, radial, and angular directions that are equal to or less than a desired value for each of the axial, radial and angular directions.

30. (Original) The heat transferring device of claim 22, wherein said third thermally conductive member comprises a plurality or more of flexible thermally conductive elements, each conductive element extending between, and being thermally coupled to, the first and second thermally conductive members.

31. (Original) The heat transferring device of claim 22, wherein each conductive element is a flexible multi-strand cable, each strand be made from a thermally conductive material.

32. (Canceled)

33. (Currently Amended) A heat transferring device for thermally communicating heat energy being produced by a rolling-element bearing for a rotating shaft of one of an apparatus or system to a heat sink, where the heat energy being generated by the rolling-element bearing is un-

useable heat energy with respect to the apparatus or system, said heat transferring device comprising:

a first thermally conductive member that is thermally coupled to the rolling-element bearing;

a second thermally conductive member that is thermally coupled to the heat sink;

a plurality or more of third thermally conductive members, a first end of each of the plurality of third thermally conductive members being thermally coupled to the first thermally conductive member and a second end of each of the plurality of third thermally conductive members being thermally coupled to the second thermally coupled conductive member;

wherein each of the plurality of third thermally conductive members is configured and arranged so that a majority of the heat energy being generated by the rolling element bearing is communicated to the heat sink via the first thermally conductive members, the plurality of third thermally conductive members and the second conductive member respectively; and

wherein each of the plurality of third thermally conductive members is configured and arranged so as to yield a structure that allows relative motion between the first and second thermally conductive members.

34. (Currently Amended) The heat transferring device of claim 32 wherein each of the plurality of third thermally conductive members is configured and arranged so that one of at least 50% or 80% of the heat energy being generated by the rolling-element bearing is communicated to the second thermally conductive member via the plurality of third thermally conductive members.

35. (Original) The heat transferring device of claim 32, wherein the structure yielded allows relative motion in one of in one direction, in two directions or in three directions.

36. (Original) The heat transferring device of claim 32, wherein the structure yielded allows relative motion in at least one of a radial direction, an axial direction, or an angular direction.

37. (Original) The heat transferring device of claim36, wherein the structure yielded has spring constants in each of the axial, radial and angular directions that are equal to or less than a desired value for each of the axial, radial and angular directions.

38. (Currently Amended) An apparatus including a rotating member comprising:

a rolling-element bearing that rotatbly supports the rotating member and that generates un-useable heat energy with respect to the apparatus;

a heat transferring device including a flexible thermally conductive member, a first end of which is thermally coupled to the rolling-element bearing, and a second end of which is thermally coupled to a heat sink.

39. (Currently Amended) The apparatus of claim 38, wherein the flexible thermally conductive member is configured and arranged so that at least some of the heat energy being

generated by the rolling-element bearing that rotatbly supports the rotating member is communicated to the heat sink.

40. (Currently Amended) The apparatus of claim 38, wherein the flexible thermally conductive member is configured and arranged so as to allow relative motion between the rolling-element bearing and a portion of the heat sink.

41. (Original) The apparatus of claim 40, wherein the relative motion being allowed is in one of in one direction, in two directions or in three directions.

42. (Currently Amended) The apparatus of claim 40, wherein the relative motion being allowed is in at least one of a radial direction, an axial direction, or an angular direction with respect to the rolling-element bearing.

Claims 43-47 (Canceled)

48. (Currently Amended) A flywheel energy storage system comprising:

a flywheel;

a shaft to which is secured the flywheel;

at least one bearing assembly that rotatably supports the shaft;

a heat sink; and

a heat conduction device for said at least one bearing assembly, the heat conduction device including a flexible thermally conductive member, a first end of which is thermally coupled to the at least one bearing assembly, and a second end of which is thermally coupled to a heat sink; and

wherein the flexible thermally conductive member is comprised of a plurality or more of flexible elements.

49. (Original) The flywheel energy storage system of claim 48, wherein the flexible thermally conductive member is configured and arranged so that at least some of the heat energy being generated by the at least one bearing assembly is communicated to the heat sink.

50. (Previously Presented) The flywheel energy storage system of claim 49, wherein the flexible thermally conductive member is configured and arranged so that a majority of the heat energy being generated by the bearing assembly is communicated to the heat sink heat conduction device.

51. (Previously Presented) The flywheel energy storage system of claim 49 wherein the flexible thermally conductive member is configured and arranged so that one of at least 50% or 80% of the heat energy being generated by the bearing assembly is communicated to the heat sink via the heat conduction device.

52. (Original) The flywheel energy storage system of claim 48, wherein the flexible thermally conductive member is configured and arranged so as to allow relative motion between the at least one bearing assembly and a portion of the heat sink.

53. (Original) The flywheel energy storage system of claim 52, wherein the relative motion being allowed is in one of in one direction, in two directions or in three directions.

54. (Original) The flywheel energy storage system of claim 52, wherein the relative motion being allowed is in at least one of a radial direction, an axial direction, or an angular direction.

55. (Original) The flywheel energy storage system of claim 54, wherein the flexible thermally conductive member is configured and arranged so as to have spring constants in each of the axial, radial and angular directions that are equal to or less than a desired value for each of the axial, radial and angular directions.

56. (Previously Presented) A flywheel energy storage system comprising:

a flywheel;

a shaft to which is secured the flywheel;

at least one bearing assembly that rotatably supports the shaft;

a heat sink;

a heat conduction device for said at least one bearing assembly, the heat conduction device including a flexible thermally conductive member, a first end of which is thermally coupled to the at least one bearing assembly, and a second end of which is thermally coupled to a heat sink; and

a plurality of flexible thermally conductive members, where the first end of each of the plurality of flexible thermally conductive members is thermally coupled to the at least one bearing assembly and where the second end of each of the plurality of flexible thermally conductive members is thermally coupled to the heat sink.

57. (Canceled)

58. (Currently Amended) ~~The flywheel energy storage system of claim 48,~~ A flywheel energy storage system comprising:

a flywheel;

a shaft to which is secured the flywheel;

at least one bearing assembly that rotatably supports the shaft;

a heat sink;

a heat conduction device for said at least one bearing assembly, the heat conduction device including a flexible thermally conductive member, a first end of which is thermally coupled to the at least one bearing assembly, and a second end of which is thermally coupled to a heat sink; and

wherein the flexible thermally conductive member is a flexible multi-strand cable, where one or more strands comprises a thermally conductive material.

59. (Original) The flywheel energy storage system of claim 48, further comprising:

a first thermally conductive member being configured and arranged to thermally couple the first end of the flexible thermally conductive member to the at least one bearing assembly; and

a second thermally conductive member being configured and arranged to thermally couple the second end of the flexible thermally conductive member to the heat sink.

60. (Original) The flywheel energy storage system of claim 59, wherein the first thermally conductive member and the second thermally conductive member are arranged such that the flexible thermally conductive member extends therebetween in on of a generally radial direction or a generally axially direction.

61. (Original) The flywheel energy storage system of claim 60, wherein at least a portion of the flexible thermally conductive member extending therebetween is arcuate.

62. (Original) The flywheel energy storage system of claim 48, wherein the flexible thermally conductive member comprises a thermally conductive material that is at least one of copper, aluminum, silver and carbon.

63. (Original) The flywheel energy storage system of claim 59, wherein each of the first and second thermally conductive members comprises a thermally conductive material that is at least one of copper, aluminum, silver and carbon.

64. (Previously Presented) A flywheel energy storage system comprising:

a flywheel;

a shaft to which is secured the flywheel;

a heat sink;

a plurality of bearing assemblies that rotatably supports the shaft;

a heat conduction device for said at least one bearing assembly, the heat conduction device including a plurality of heat conduction devices at least one for each of the plurality of bearing assemblies; and

wherein each of the plurality of the heat conduction devices includes a flexible thermally conductive member, where a first end of the flexible thermally conductive member of said at least one of the plurality of heat conduction devices is thermally coupled to a corresponding one of the plurality of bearing assemblies, and where a second end of the flexible thermally conductive member of said at least one of the plurality of heat conduction devices is thermally coupled to the heat sink.

65. (Original) The flywheel energy storage system of claim 48, further comprising a plurality of heat conduction devices for said at least one bearing assembly.

66. (Original) The flywheel energy storage system of claim 48, wherein the flexible, thermally conductive member is arcuate.

67. (Original) The flywheel energy storage system of claim 56, wherein each of the plurality of flexible, thermally conductive members is arcuate.

68. (Canceled)

69. (Currently Amended) A flywheel energy storage system comprising:

a flywheel;

a shaft to which is secured the flywheel;

at least one bearing assembly that rotatably supports the shaft;

a heat sink;

a plurality of heat conduction devices for said at least one bearing assembly, the heat conduction device including:

a first thermally conductive member that is thermally coupled to said at least one bearing assembly;

a second thermally conductive member that is thermally coupled to the heat sink;

a third thermally conductive member that is thermally coupled to the first and second thermally conductive members such that at least some of the heat energy being

generated by said at least one bearing assembly is thermally conducted to the heat sink via the first, third and second conductive members respectively; and

wherein the third thermally conductive member is configured and arranged so as to allow relative motion between the first and second thermally conductive members. ~~The flywheel energy storage system of claim 68, further comprising a plurality of heat conduction devices for said at least one bearing assembly.~~

70. (Currently Amended) ~~A flywheel energy storage system comprising:~~

~~a flywheel;~~

~~a shaft to which is secured the flywheel;~~

~~a plurality of bearing assembly that rotatably supports the shaft;~~

~~a heat sink;~~

~~a plurality of heat conduction devices, at least one heat conduction device for each of said plurality of bearing assemblies, each of the plurality of heat conduction devices including:~~

~~a first thermally conductive member that is thermally coupled to said at least one bearing assembly;~~

~~a second thermally conductive member that is thermally coupled to the heat sink;~~

~~a third thermally conductive member that is thermally coupled to the first and second thermally conductive members such that at least some of the heat energy being generated by said at least one bearing assembly is thermally conducted to the heat sink via the first, third and second conductive members respectively; and~~

wherein the third thermally conductive member is configured and arranged so as to allow relative motion between the first and second thermally conductive members. ~~The flywheel energy storage system of claim 68, further comprising a plurality of bearing assemblies and a plurality of heat conduction devices, at least one heat conduction device for each of said plurality of bearing assemblies.~~

71. (Original) The flywheel energy storage system of claim 70, wherein there is a plurality of heat conduction devices for each of said plurality of bearing assemblies.

72. (Original) The flywheel energy storage system of claim 68, wherein the relative motion being allowed is in one of in one direction, in two directions or in three directions.

73. (Original) The flywheel energy storage system of claim 68, wherein the relative motion being allowed is in at least one of a radial direction, an axial direction, or an angular direction.

74. (Original) A flywheel energy storage system comprising:

a flywheel;

a shaft to which is secured the flywheel;

at least one bearing assembly that rotatably supports the shaft;

a heat sink;

a heat conduction device for said at least one bearing assembly, the heat conduction device including:

a first thermally conductive member that is thermally, conductively interconnected to said at least one bearing assembly;

a second thermally conductive member that is thermally, conductively interconnected to the heat sink;

a multiplicity of arcuate, flexible, thermally, conductive elements, each conductive element extending between, and being thermally interconnected to, the first and second thermally conductive members such that at least some of the heat energy being generated by the bearing assembly is thermally conducted to the heat sink via the first conductive member, the multiplicity of conductive elements and the second conductive member respectively;

wherein each conductive element is a flexible multi-strand cable, each strand be made from a thermally conductive material; and

wherein the multiplicity of conductive elements are configured and arranged so as to yield a structure that allows relative motion between the first and second thermally conductive members.

75. (Original) The flywheel energy storage system of claim 74, wherein the structure yielded allows relative motion in one of in one direction, in two directions or in three directions.

76. (Original) The flywheel energy storage system of claim 74, wherein the structure yielded allows relative motion in at least one of a radial direction, an axial direction, or an angular direction.

Claims 77 - 104 (Canceled)